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Current developments and examples of sustainable energy technologies

klima+ energie fonds

Federal Ministry
Republic of Austria
Climate Action, Environment, Energy, Mobility, Innovation and Technology

Carbon Management

Concepts and technologies for sustainable carbon balance

Eliminating greenhouse gas emissions in all sectors is a top priority on the road towards a climate-neutral economic system in Austria. However, in some areas of industry, waste management and agriculture, unavoidable emissions that damage the environment will continue to exist in the future. New technologies for the capture, utilisation and storage of CO_2 could provide a solution here. Strategies and concepts for this are currently being researched and presented in Austria.

photo: stock.adobe.com

Amine scrubber for capturing CO_2, photo: voestalpine Stahl GmbH

CCU and CCS

Capture, utilisation and storage of unavoidable greenhouse gas emissions

In order for Austria to achieve the national climate targets, all sectors must reduce their emissions that are harmful to the climate as much as possible. The most important steps towards this goal involve making the switch from fossil fuels to renewable energy sources, efficient and economical use of energy and resources, and transitioning towards a circular economy. The resilience of ecosystems must also be strengthened, and permanent carbon storage in natural sinks expanded even further.

One key area is industrial production, as this is where a large proportion of CO_2 emissions arise.[1] Strategies aimed at decarbonisation have already been developed in many industrial sectors over recent years. The aim is for renewable energy sources and innovative production processes to be implemented in order to completely eliminate process-related greenhouse gas emissions. Nevertheless, these measures can only reduce part of the emissions in some industries, such as the cement, lime and glass industries, as well as in steel and iron production. CO_2 emissions will continue to be generated here as a result of chemical processes (e.g. when burning lime in order to produce cement). CO_2 is also emitted in waste management when organic materials are incinerated. The greenhouse gas scenario "Transition 2040" set out by Environment Agency Austria[2] states that residual emissions in the energy and industry, agriculture and waste management sectors will amount to around 15 per cent of original emissions (1990), corresponding to approximately 11 million tonnes of CO_2 equivalents.

Carbon capture technologies (CCU – Carbon Capture and Utilisation and CCS – Carbon Capture and Storage) for the capture, use and geological storage of carbon dioxide could be a solution for these remaining "hard-to-abate" emissions. The objective is to bind CO_2 on a permanent basis so that it does not enter the atmosphere.

[1] Total emissions from the energy and industrial sectors (including emission trading) amounted to 32.6 million tonnes of CO_2 equivalent in 2022. Industry accounted for the largest share of the energy and industrial sectors in 2022 with 24.7 million tonnes of CO_2 equivalent, with emissions from this sector increasing by 3.0 million tonnes or 14% when compared with 1990. www.umweltbundesamt.at/fileadmin/site/publikationen/rep0913.pdf

[2] Source: FAQs on CCU and CCS, Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) 2024, www.umweltbundesamt.at/fileadmin/site/publikationen/rep0880.pdf

CARBON CAPTURE AND UTILISATION (CCU)

The aim of CCU processes is to reduce the output of process emissions from industrial sources by capturing CO_2 treating it and using it in at least one further utilisation cycle as a valuable raw material for chemical or biotechnological processes. Various technologies for capturing CO_2 from flue gas have already been developed to industrial maturity. Locations with large quantities of CO_2 emissions, known as point sources, e.g. from cement and steel production, are relevant for the purposes of CO_2 separation. Research is also being conducted into methods for capturing CO_2 directly from the air. However, CCU technologies require large quantities of electricity and heat. The energy used must in all cases come from renewable sources and the entire CO_2 balance of the process must be considered in order to achieve a positive climate effect.

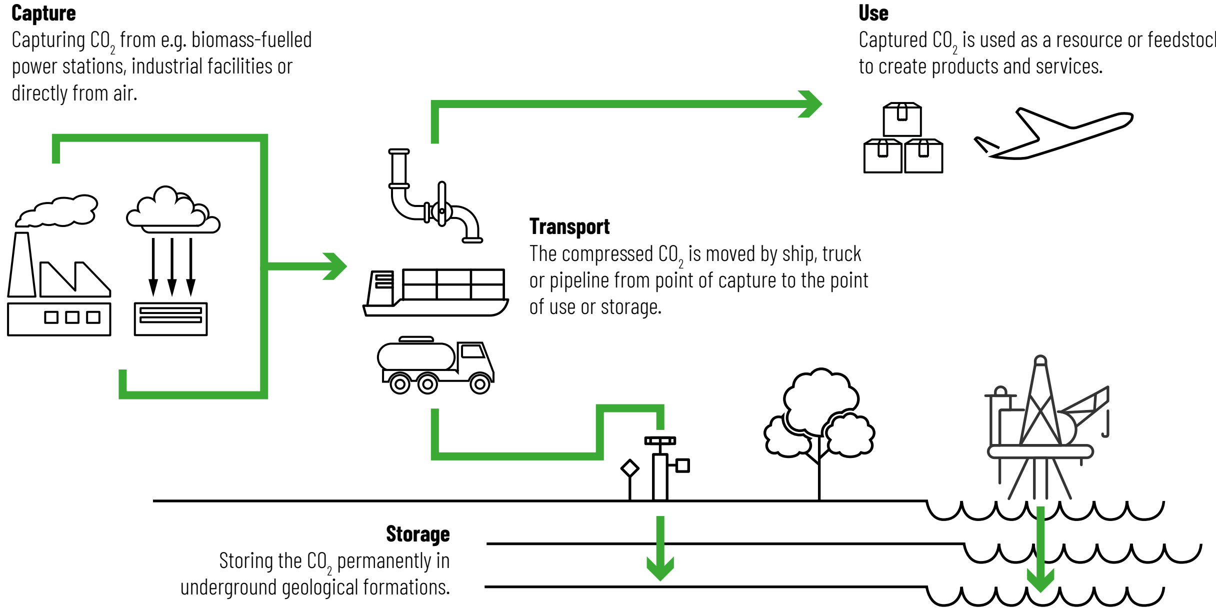
Once the CO_2 has been treated accordingly, all products containing carbon can in principle be produced at the next stage. Potential uses include the production of urea for nitrogen fertilisers or synthetic resins, polyol, e.g. for the production of polyurethane (PU foam) or methanol, which forms the basis for producing many other chemical products. Synthetic fuels such as synthetic kerosene can also be produced this way. However, this continued use only leads to displaced or delayed emissions because the CO_2 is not bound on a permanent basis using this process.

Among other initiatives, research is also being conducted into converting mineral raw materials into carbonates in reaction with CO_2, which can then be used as building material additives (e.g. in concrete). A further topic for research currently is CO_2 utilisation through biological methanation (bio-electrochemical processes and geo-methanation).

CARBON CAPTURE AND STORAGE (CCS)

CCS refers to the capture, transportation and long-term storage of CO_2 in underground storage facilities. Geological storage of CO_2 has been implemented globally for decades in projects ranging from small-scale pilot schemes to large-scale industrial projects and under different geological framework conditions. Suitable geological storage sites include depleted oil or natural-gas storage facilities and rock layers containing salt water that are known as saline aquifers. The Intergovernmental Panel on Climate Change (IPCC) believes that processes for capturing CO_2 and permanent geological storage or binding are required in order to achieve the Paris climate targets. This is on the condition that CO_2 is only stored in a location that is safe, environmentally sustainable and permanent.

In this edition we will present some current projects from Austria that are developing and showcasing new concepts and technologies for the capture, conversion and utilisation of CO_2.



Carbon management plus CCU and CCS: There will continue to be a portion of greenhouse gas emissions that are difficult or impossible to avoid in future ('hard-to-abate'). The objective is to achieve a balance between these emissions and the absorption of CO_2 from the atmosphere in permanent carbon sinks. Source: climate.ec.europa.eu/eu-action/carbon-capture-use-and-storage/overview_en

National Carbon Management Strategy

Guidelines for Austria

In Austria, geological storage of CO_2 is currently not permitted – except for research purposes with a planned total storage volume of under 100,000 tonnes. A national Carbon Management Strategy (CMS) was adopted in 2024 that had been developed jointly by the Ministry of Finance (BMF) and the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), with involvement from relevant stakeholders and with the support of an international scientific advisory board.

The strategy records the national status quo and highlights the necessary reforms as well as further planning measures on the way towards cost-effective carbon management for residual emissions in Austria that are either difficult or impossible to avoid. Approval for the geological storage of these remaining CO_2 emissions in the federal territory of Austria under strict safety and environmental conditions is recommended.

The following definition was also developed for 'hard-to-abate' emissions as part of the strategy:

"Process-related CO_2 emissions are considered unavoidable if their generation cannot be prevented despite optimisation of the production process or the product. These CO_2 emissions are considered unavoidable in the context of the transformation to a climate-neutral base materials industry if no alternative processes and no alternative products or resources are available for the same application or if the potential for these is limited."

The guidelines cover the basic legal framework and contain an action plan for efficient planning and implementation of carbon management and development of the necessary infrastructure in Austria.

www.bmk.gv.at/themen/klima_umwelt/klimaschutz/nat_klimapolitik/co2/cms.html

"CCUS technologies can make a significant contribution in terms of reducing process-related CO_2 emissions, primarily in sectors such as cement, steel and waste management that cannot be decarbonised in their entirety. Combined with biomass (BECCS), they enable negative emissions and can thereby compensate for unavoidable residual emissions. The sustainability of these depends on the overall framework conditions, as CO_2 capture and storage are extremely energy-intensive. This demand for energy must be met entirely from renewable energy sources.

Permanent storage is also essential in order to remove emissions from the carbon cycle over the long term. This enables CCUS to be a building block in achieving climate neutrality. However, the use of these technologies must not serve as an excuse to prolong reliance on fossil fuels or to delay decarbonisation measures and fundamental transformation processes in industry, mobility and the building sector."

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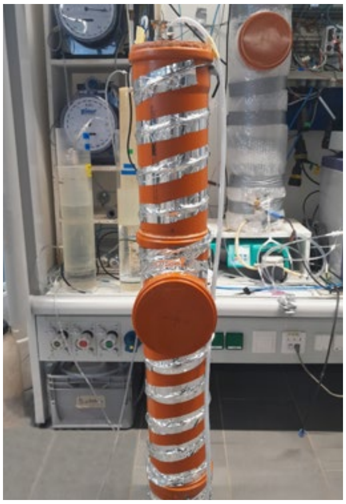
Photo: Markus Zahradnik




The investigations involved two trickle-bed reactors being built for biomethanation before they were put into operation at TU Wien. Each had a bulk volume of 17 litres and a total volume of 21.4 litres.
Photos: TU Wien, Institute of Water Quality and Resource Management

BioMeFilm

Utilisation of CO_2 in biogas at sewage treatment plants

The utilisation of CO_2 from industrial waste gases by methanation is a process in which methane, a valuable product that can be widely distributed over the existing infrastructure and also stored over the long term like natural gas, is produced e.g. using renewable energy sources and hydrogen. The technology for industrial-scale methanation has already reached market readiness. The process usually requires high temperatures and achieves efficiency levels of around 80%.

Another innovative concept currently being researched at TU Wien is the utilization of carbon dioxide via methanation in biogas at large sewage treatment plants. The gas also contains around 35% carbon dioxide in addition to around 65% methane. As with industrial methanation, this process also involves the use of electricity from renewable energy sources in order to split water into oxygen and hydrogen using electrolysis.

A BIOLOGICAL PROCESS WITH HIGH POTENTIAL

Unlike the industrial process, a biological methanation process triggered by archaea is used here to convert the carbon dioxide, occurring at low temperatures (around 38 °C). One further advantage is that the processed raw gas already has a high methane content, meaning that the methane content in the biogas produced can be increased to almost 100 per cent. Sewage treatment plants that produce biogas also generally have the infrastructure required for gas storage and for further conversion into electricity. They are large consumers themselves, and this enables them to balance out peaks in supply and demand.

The concept has three objectives: relieving the strain on the power grid by consuming energy locally, longer-term storage of surplus energy from photovoltaic and wind power and a reduction in CO_2 emissions. The energy potential from implementation of biological methanation, which is particularly interesting for wastewater treatment plants with existing biogas production, is 220 GWh per year for Austria, or 3% of renewable electricity production or 1% of the total natural gas demand.

RESEARCH ON BIOFILM REACTORS

The basic feasibility of the utilization of carbon dioxide via biological methanation in the biogas of wastewater treatment plants has already been trialed in a preliminary project. The procedural concept, which is based on the immobilisation of the bacterial biomass on carrier material, was developed in this context.

The key factors for implementing the process are now being systematically investigated in the BioMeFilm project (biological methanation in a biofilm reactor), with the objective of developing the technology readiness level (TRL) even further. Key aspects of the project include an investigation into the nutrient and trace element requirements of the archaea, the long-term stability and efficiency of a biological methanation plant, and its behaviour in 'on-off' operation involving longer periods with no carbon dioxide or hydrogen being fed into the system. The project partners are the Institute of Water Quality and Resource Management at TU Wien and the Competence Center CHASE GmbH, which is involved in designing and configuring carrier material and reactor forms.

The project aims to create the process and procedural foundations required for a scale-up and large-scale technical implementation, in order to construct and operate biofilm methanation plants at the site of wastewater treatment plants with biogas production. The research work is being supported by operators of large sewage treatment plants and energy supply companies.

projekte.ffg.at/projekt/4536647

MCi CCU pilot plant Newcastle, photo: MCi Carbon

CCUpScale

Pilot plant in Tyrol for mineral binding of CO_2

The Austrian corporation RHI Magnesita is planning to build a carbon capture and utilisation (CCU) test plant in Hochfilzen in Tyrol that could be used as a global model for mineral carbonation. The plan is for a new technology developed by the Australian cleantech start-up MCi Carbon to be showcased here from 2028 within the scope of real-life operations.

RHI Magnesita is the global market leader in high-grade refractory products and systems, which are essential for high-temperature processes above 1,200 °C in the steel, cement, non-ferrous metals and glass industries. Refractory materials protect production plants (e.g. blast furnaces in the steel industry) from extreme heat and chemical attacks and play a key role in recycling metals. The company has a fully integrated added value chain, from raw materials to refractory products through to end-to-end solutions.

RHI MAGNESITA

The company is a global market leader in refractory products and systems and employs more than 20,000 people at 67 main production sites (including raw material sites), 12 recycling plants and more than 70 sales offices.

PIONEERING TECHNOLOGY FROM AUSTRALIA

Producing refractory materials is a very energy and emission-intensive process. This is why RHI Magnesita invests in innovative technologies and solutions aimed at reducing emissions on a continuous basis. Carbon Capture and Utilisation plays a key role in this. The company is working with the Australian start-up MCi Carbon, which has developed a key technology for mineral carbonation.

The technology, which is currently being tested in Australia, converts CO_2 from industrial processes into industrial minerals such as magnesite and silicate. These materials can be used in construction products such as concrete and cement, as well as in ceramics, fertilisers, paper and plasterboard. RHI Magnesita is the main investor and first global commercial customer of MCi Carbon. The pilot operations in Australia are intended to evaluate the scalability of the technology and enable its use in Austria from 2028.

MCi CCU pilot plant Newcastle, photo: MCi Carbon

RHI Magnesita's Hochfilzen site with rendering of the CCU test facility, photo: RHI Magnesita

PILOT PLANT IN TYROL

RHI Magnesita plans to roll out a commercial-scale carbon capture and utilisation (CCU) test plant from 2028 at the Hochfilzen site in Tyrol, which will extract 50,000 tonnes of CO_2 per year from the flue gas stream and convert it into industrial minerals that are chemically stable. In a subsequent stage the company aims to decarbonise 90% of the entire site by the start of the 2030s. The construction of the first commercial CCU test plant in Hochfilzen requires additional investments of more than EUR 100 million.

In addition to public funding, successful implementation of the project also crucially depends on the fact that the CO_2 captured using MCi carbon technology is recognised as permanently chemically bound and that there is no obligation to surrender EU-ETS allowances.

RHI Magnesita is fully committed to using renewable energy sources to support the project. There are also plans in place to optimise the site logistics using a new logistics centre so that raw materials and products can be transported by rail even more efficiently.

CONTRIBUTION TO CLIMATE NEUTRALITY AND THE CIRCULAR ECONOMY

The raw material for the refractory products is magnesium carbonate, which is mined by RHI Magnesita. CO_2 is released from the rocks during the production of the refractory material and escapes into the atmosphere. The plan is to capture the CO_2 in future and convert it into a silicate mineral as well as magnesium carbonate in the MCi plant.

Using the silicate product as a low-CO_2 alternative aggregate, e.g. in the cement industry, can save up to 50% CO_2 per tonne. RHI Magnesita plans to supply 800,000 tonnes of silicate to the cement industry over the long term (mainly regionally, within a radius of a few hundred kilometres). It also plans to process 350,000 tonnes of magnesite using the CO_2 cycle process and use this as a raw material in various industries, without any additional CO_2 being released. This means that RHI Magnesita will be making a crucial contribution to decarbonisation, both at the Hochfilzen site as well as in other industries.

INTERNATIONAL AWARDS AND FUNDING

The 'CCUpScale' project was honoured with the Net-Zero-Industries Award as 'National Winner Austria' in the 'Outstanding Projects' category in 2024.[1]

Within the scope of the 'Australia-Austria Call for Industrial Decarbonisation' of the Mission Net-Zero-Industries, the startup MCi Carbon is being funded by the Australian side, while RHI Magnesita is being supported by the Austrian Climate and Energy Fund for the development of the CCU pilot plant in Hochfilzen. This R&D funding will enable crucial activities, such as the analysis of raw materials, pre-trial testing, scale-up process engineering and industrial integration – key milestones for advancement of the pioneering CCU plant.

www.rhimagnesita.com/rhi-magnesita-and-australian-cleantech-mci-carbon-enter-long-term-strategic-cooperation-to-decarbonise-refractories

[1] mission-innovation.net/missions/net-zero-industries-mission/net-zero-industries-award-2024

ZEUS and C-CED lead projects

New technologies for CO_2 capture and utilisation

There are various concepts and processes available for the capture and further utilisation of CO_2 from industrial waste gases, which all have their different advantages and disadvantages. In addition to the level of technical maturity, the investment requirements and the running costs are decisive factors in evaluating and deploying these concepts. Two major lead projects are currently researching and trialing pioneering CCU technologies for a sustainable carbon cycle.

ZEUS (ZERO EMISSIONS THROUGH SECTOR COUPLING)

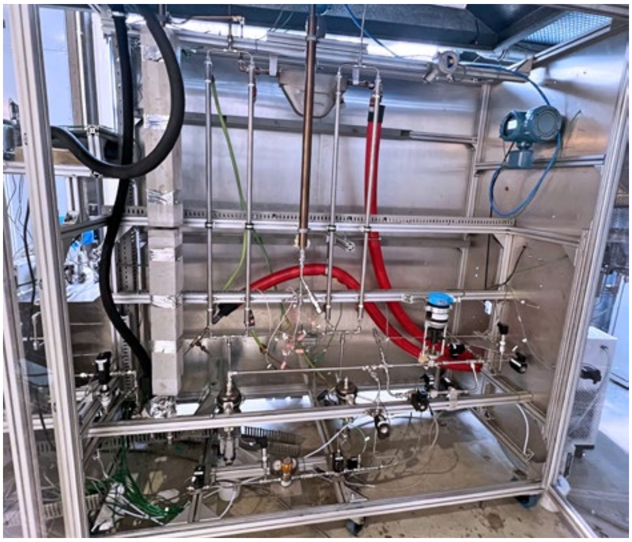
Partners from the energy sector, industry and research[1] are working together in the ZEUS lead project led by K1-MET to trial the production of green hydrogen and the recycling of renewable gases and liquid hydrocarbons based on examples from the steel and cement industries. Various technologies are being researched, tested and in some cases combined with each other for this in the industrial environment (see eia 02/2024).

www.wiva.at/project/zeus

CO_2 ELECTROLYSIS

The electrochemical conversion of CO_2 is an innovative approach to the production of sustainable chemical raw materials. Similar to an electrolysis cell for water, CO_2 can be continuously converted into products that contain carbon such as synthesis gas (a mixture of CO and H_2) or formic acid in an electrochemical cell using renewable electricity. The catalyst used and its integration into the electrochemical cell, the cell design and the optimisation of the process parameters are all crucial factors. By controlling the process parameters, for example, the CO/H_2 ratio in the product gas can be flexibly adjusted. Two pilot plants are being implemented as part of the ZEUS project: one in the steel industry at voestalpine Stahl GmbH (product: synthesis gas) and one in the cement industry (Rohrdorfer in Gmunden, product: formic acid). The project objective is to demonstrate this technology for the first time using real CO_2 from industrial waste gases and for recycling CO_2 at both industrial sites. Both plants are among the largest in the world with a scale of 5 kg/h.

[1] **PROJECT PARTNERS**: K1-MET GmbH, Energy Institute at the Johannes Kepler University Linz, Institute of Organic Chemistry – Johannes Kepler University Linz, GIG Karasek GmbH, The University of Leoben – Chair of Process Engineering for Industrial Environmental Protection, Rohrdorfer Zement – Zementwerk Hatschek GmbH, TU Wien – Institute of Chemical, Environmental and Bioscience Engineering, Verbund AG, voestalpine Stahl GmbH, WIVA P&G – Hydrogen Initiative Flagship Region Austria Power & Gas



Structure of catalytic methanation, photo: University of Leoben

CATALYTIC METHANATION

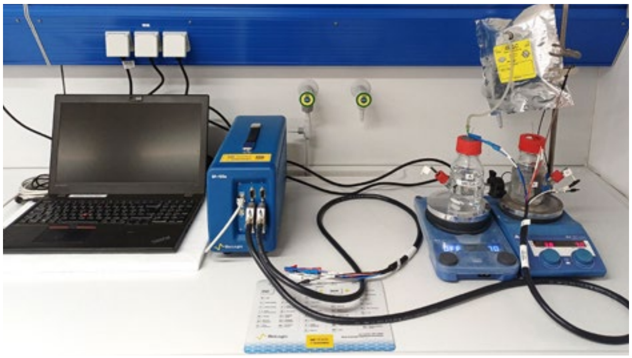
This process involves synthetic methane (SNG) being formed from the input materials green hydrogen (H_2) and carbon dioxide (CO_2). H_2 and CO_2 react at an elevated temperature (250–400°C) and elevated pressure (4–15 bar) in a reactor that is operated on a continuous basis to form the desired SNG.

The ZEUS project involves the implementation of a 100 kW pilot plant (around 10 Nm^3/h SNG as product gas) with the technology being trialed for the first time in the steel industry at voestalpine Stahl GmbH/K1-MET GmbH in Linz. The research is focused on the dynamic operating mode and the investigation of various catalysts developed by the Chair of Process Technology and Environmental Protection at the University of Leoben. The process involves the use of real gases, green hydrogen from the 6 MW PEM electrolysis plant operated by voestalpine Stahl GmbH/Verbund AG, as well as CO_2, which has been separated from the voestalpine Stahl GmbH power plant flue gas by amine scrubbing. The objective is to achieve a high rate of conversion of CO_2 into SNG and high catalyst stability. The synthetic methane produced will be reused in the steel industry to create a closed CO_2 cycle.

CARBON-CYCLE ECONOMY DEMONSTRATION (C-CED)

Industrial and research partners[1] are currently investigating various technologies for CO_2 separation from real gases as well as the utilisation of CO_2 through methanation in the lead project coordinated by RAG Austria AG.[2] Amine scrubbing for the separation of CO_2 from steel industry waste gases has been demonstrated in a pilot plant at the voestalpine Stahl GmbH site in Linz since 2023 (see eia 03/2024).

www.wiva.at/project/c-ced



Laboratory set-up for a bioelectrochemical system for the conversion of CO_2 into methane, photo: K1-MET GmbH

CO_2 UTILISATION THROUGH BIOLOGICAL METHANATION

Bioelectrochemical systems have been subject to scientific investigations for many years as an environmentally friendly method for converting CO_2 into valuable compounds such as methane. These processes involve the introduction of microorganisms into the cathode chamber of an electrochemical cell. An external voltage is applied to this cell and hydrogen is produced. The microorganisms colonise the electrode and serve as biocatalysts for the conversion of CO_2 with hydrogen into synthetic methane. CO_2 is captured in the amine scrubber as part of the C-CED project at the voestalpine Stahl GmbH site, before being then fed into a bioelectrochemical system to produce synthetic methane (currently on a laboratory scale). As the main component of natural gas, methane could then be reused in industry or to generate electricity, thereby closing the carbon cycle.

[1] **PROJECT PARTNERS:** RAG Austria AG (project coordination); ACIB GmbH, Axiom angewandte Prozesstechnik GmbH, Energie AG Upper Austria, Energy Institute at JKU Linz, K1-MET GmbH, University of Natural Resources and Life Sciences Vienna - Department IFA Tulln Institute of Environmental Biotechnology, WIVA P&G; voestalpine Stahl GmbH

[2] www.rag-austria.at/forschung-innovation/carbon-cycle-economy-demonstration.html

[3] Credits and partners in the EcoFuel project: www.ecofuel-horizon.eu

[4] Credits and partners in the C-CED project: www.wiva.at/project/c-ced

Both lead projects are being implemented as part of the WIVA P&G – Hydrogen Initiative Flagship Region Austria Power & Gas. www.wiva.at

DAC- trial plant – Upscaling concepts for the new DAC process, photo: Axiom angewandte Prozeßtechnik GmbH

SEPARATION OF CO_2 FROM THE ATMOSPHERE

Another innovative technology being researched as part of the lead project is the Direct Air Capture (DAC) process. This technology captures carbon dioxide directly from ambient air rather than from stationary emission sources, such as industrial plants or power stations. The DAC technology has the potential to play a crucial role in closing carbon cycles, particularly in sectors like aviation. Furthermore, the CO_2 captured from the atmosphere could serve as a sustainable carbon source in the future. Conventional methods for CO_2 separation are not well-suited for DAC applications due to the low concentration of CO_2 in the air. To address this challenge, the company Axiom has developed an innovative process for separating CO_2 from the atmosphere. This process can provide diluted atmospheric CO_2 in a concentrated and virtually 100 % pure state, regardless of the location. At the heart of this technology are two potassium carbonate circuits coupled with a multi-layer bipolar electrodialysis stack.

The primary goal of the DAC technology is to supply carbon for the synthesis of sustainable fuels and hydrocarbons. The new process was first tested in cooperative research projects. Since 2023, Axiom has been conducting experimental operations at its premises in Ebreichsdorf, Lower Austria. Initial batches of concentrated atmospheric CO_2 from these tests have already been utilized by project partners as a carbon source for experimental production of SAFs (Sustainable Aviation Fuels) within the EU Ecofuel project.[3] Ongoing efforts in the follow-up C-CED project[4] are exploring various scenarios for integrating the DAC process into a closed carbon cycle.

"Greenstar" sequestra

Permanent CO_2 storage in industrial waste materials

The climate technology start-up company sequestra offers an innovative solution for reducing CO_2 emissions on a global scale while at the same time making industrial waste commercially viable. The young company based in Vienna and Attnang-Puchheim in Austria develops customised technologies that store CO_2 from exhaust gases in industrial waste materials through carbonation. This enables industrial companies to reduce their emissions by up to 50 per cent depending on the waste materials involved.

sequestra's concept has great potential for use in many sectors of industry. More than 10,000 European industrial plants, including 200 in Austria, are part of the emissions trading system (ETS), which caps CO_2 emissions and requires allowances. The "Fit for 55" strategy will gradually eliminate free allowances by 2034, significantly increasing costs for companies with high CO_2 emissions.

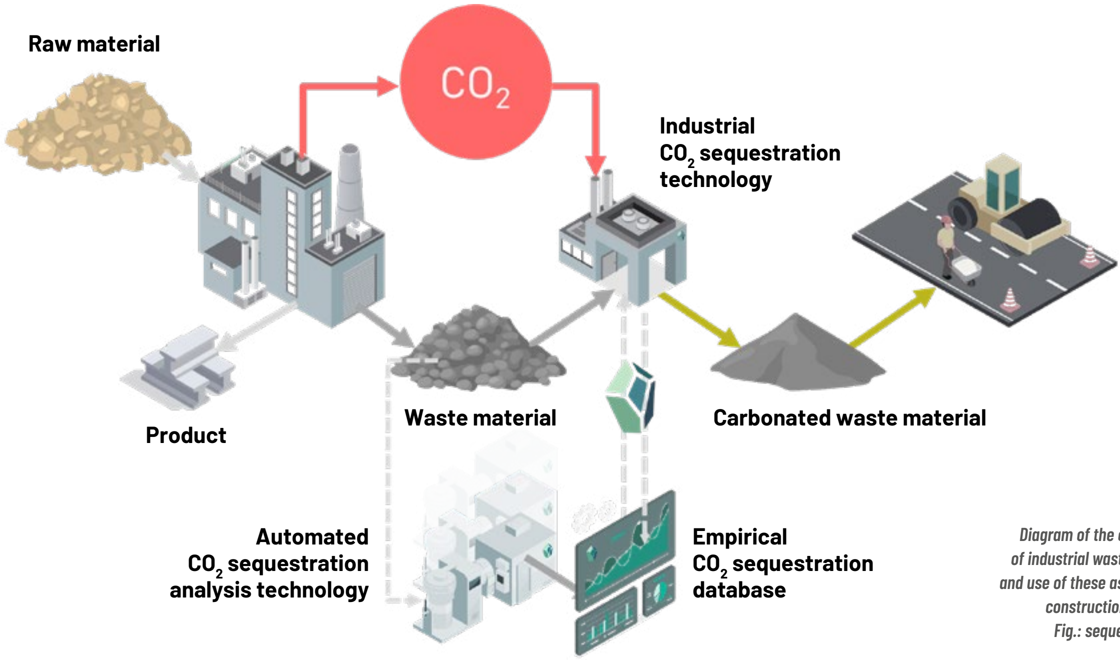
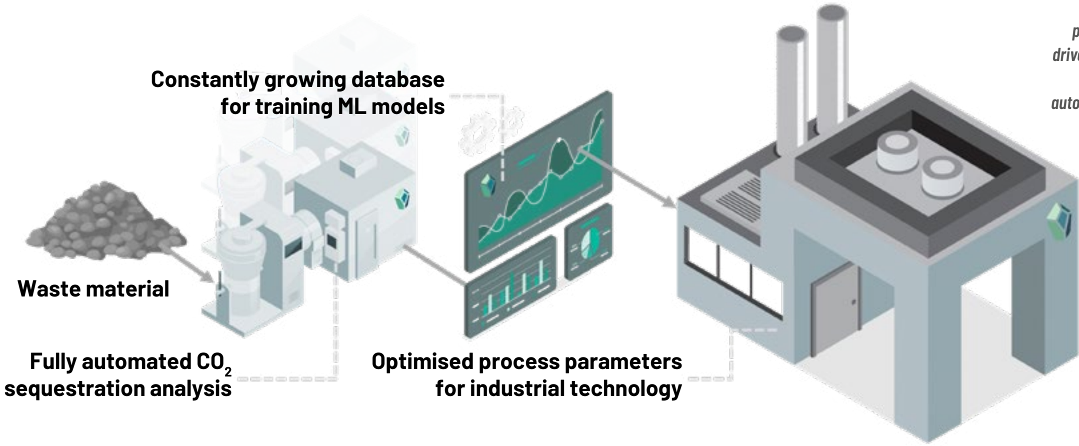


Diagram of the carbonation of industrial waste materials and use of these as secondary construction materials, Fig.: sequestra FlexCo

The team from sequestra FlexCo during prototype development, photos: sequestra FlexCo



Management of the industrial process using sequestra's data-driven approach. Optimum process parameters are ascertained automatically in the laboratory and applied on an industrial scale. Fig.: sequestra FlexCo

Many industrial waste materials have substantial potential for chemically binding CO_2. Large quantities of industrial by-products are accumulated around the world that are not reused but are instead disposed of in landfills. Use of these materials for CO_2 storage would contribute towards a significant reduction in greenhouse gas emissions. Many of these materials could also find their way into various markets in a carbonated form in the future.

Concepts for storing CO_2 in industrial waste have not yet been put into use. The reasons for this include the low CO_2 prices, as well as the complicated process for managing the sequestration procedures, which depends on the respective characteristics of the various waste materials. sequestra's innovative technology concept enables cost-effective and rapid identification of best-case parameters for the respective groups of waste materials and application of these parameters on an industrial scale.

The start-up company is targeting heavy industries that generate carbonisable waste materials and/or produce CO_2 emissions that are difficult to reduce. Steel slag, construction waste, incinerator ash and many other waste materials have the potential for storing CO_2 in a stable manner and over the long term, thereby reducing emissions. The estimated potential CO_2 reduction is 3.7 Gt per year, which equates to around 10% of global emissions.[1]

The business model of the Austrian start-up is based on three pillars: sequestra charges fees for evaluations of the maximum CO_2 storage potential for any material and identifies optimised parameters to achieve this. Income is generated through licence fees when a sequestration plant is implemented. The main focus, however, is on the efficient process management at industrial plants and the monitoring, reporting and validation of stored CO_2 emissions in compliance with the law, in the aim of generating recurring and scalable revenues.

The innovative concept received the Greenstart Award from the Climate and Energy Fund in 2024.

www.sequestra.tech
greenstart.at/projekt/sequestra

[1] Study: www.nature.com/articles/s41893-020-0486-9

greenstart
Eine Start-up-Initiative des Klima- und Energiefonds

The "greenstart" programme from the Climate and Energy Fund aims to develop the potential for innovative and green business models in Austria. The support programme helps both aspiring and established young companies in (further) developing and implementing their business ideas. Since 2014, greenstart has already supported 100 start-ups, many of which have successfully entered the market and proven their ability to hold their own in a competitive environment.
greenstart.at

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